Evaluation of a New Integrated Discharge Prescription Form

Nicolas Paquette-Lamontagne, William M McLean, Lysanne Besse, and Jean Cusson

OBJECTIVE: To determine whether a new discharge prescription form which integrates admission medications, in-hospital changes, and discharge medications could enhance the accuracy of information in patient profiles in community pharmacies after hospital discharge.

DESIGN: Nonrandomized, prospective, multi-site study.

SETTINGS: Internal medicine wards of the three teaching hospitals (1200 beds) of the Centre Hospitalier de l’Université de Montréal.

SUBJECTS: Patients admitted to the internal medicine wards between January 4 and 31, 1999, at St.-Luc and Notre-Dame Hospitals formed the control group and received a usual discharge form (UD). Those admitted between February 1 and 28, 1999, received the new discharge prescription form (DPF) capturing the list of admission medications and revisions during hospitalization; they served as the experimental group.

METHODS: Patient profiles were reviewed to calculate conformity rates of community pharmacy patient profiles after discharge and the rate of overall conformity for each group in the study. Each drug in the patient profile was assessed according to six criteria. Healthcare providers’ satisfaction with the DPF was assessed via a written questionnaire.

RESULTS: Eighty-nine patients and 669 discharge medications were studied. The patient profiles had a higher conformity rate in the DPF group than in the UD group (82% vs. 40%; p < 0.001); improvement could be attributed to higher conformity rates, particularly for two criteria (medications stopped in hospital and dose changes in hospital).

CONCLUSIONS: Integration of admission medications, in-hospital changes, and discharge medications on a single form increases the conformity rates of community pharmacy patient profiles after hospitalization. This tool is well accepted by both pharmacists and physicians and may lead to a major decrease in drug-related problems.

KEY WORDS: community pharmacy, discharge prescription, patient profile, seamless care.

For a long time, community pharmacists have been demanding better communications with the hospital milieu.\textsuperscript{8,9} Several pilot projects in Australia, the US, and Canada have demonstrated the importance of increasing the quantity of information on prescription orders. Bergeron et al.\textsuperscript{10} developed a pharmaceutical care concept at discharge and sent a care plan to community pharmacists, which was very well received. Liddell and Goldman\textsuperscript{11} reported the benefits related to annotated prescriptions, but also noted the difficulty in changing physicians' prescribing habits. In addition, Kuehl et al.\textsuperscript{12} clearly demonstrated that increasing the exchange of information between hospital and community pharmacists led to an increase in the number of interventions by pharmacists from both settings. Dvorak et al.\textsuperscript{13} showed that a referral form sent to community pharmacists with the discharge prescriptions aided in patient care.

With a goal to improve continuity of care, McLean\textsuperscript{7} reported a successful mechanism by which a discharge prescription and notes form facilitated information exchange between the hospital pharmacist and the patient’s community pharmacist and family physician. Warholak-Juarez et al.\textsuperscript{14} were able to demonstrate that pharmacists could make better decisions on drug use review when they had more complete patient information. Nevertheless, no study has measured the real impact of additional information for community pharmacists, and no evaluation has been undertaken on physicians’ and pharmacists’ attitudes toward this intervention.

**Methods**

**PATIENTS AND STUDY DESIGN**

This prospective, nonrandomized investigation was conducted in the internal medicine wards of the three hospitals of the Centre Hospitalier de l’Université de Montréal in 1999, after approval by the institutional Scientific and Research Ethics Committees.

Patients admitted to the internal medicine wards between January 4 and 31, 1999, at the St.-Luc and Notre-Dame Hospitals formed the control group, for which the usual discharge prescription was used (UD group). Those admitted to those hospitals, as well as Hôtel-Dieu, between February 1 and 28, 1999, received the new discharge prescription form (DPF) (Figure 1) and constituted the experimental group. Exclusion criteria were patient refusal to participate, lack of an identifiable community pharmacy, inability of the researcher to contact the community pharmacy at discharge, no discharge prescription or prescription information not available, transfer to another care unit or a long-term care facility, and death.

At their arrival on the ward, patients were met by a team pharmacist who sought their participation and the identity of their usual community pharmacy. If a patient identified several pharmacies, all were included. The pharmacist then contacted the community pharmacy by telephone to obtain patient profile information. This information was recorded on a data collection sheet and confirmed by a medication history performed by the researchers. The data collection sheet was not available to the treatment team. Within 10 working days of discharge, the pharmacist communicated with the patient’s pharmacy to gather information con-

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**Figure 1.** Discharge prescription form (translated from French).
cerning the patient’s profile at that time for comparison with the hospital chart.

CONFORMITY DATA

The patient profiles were reviewed to calculate the rate of overall conformity for each group in the study. Each drug in the patient profile was assessed according to the criteria presented in Table 1. When a drug did not meet one of the criteria or a difference was noted in allergies documented, the chart was considered to not be in conformity. The rate of conformity was calculated by dividing the number of conforming charts by the total number. The number of drugs in conformity with all criteria was noted, as well as the number of drugs the patient was receiving after discharge that were not prescribed at that time. Moreover, the nonconformity rate for each criterion was calculated by dividing the number of nonconforming drugs by the total number of drugs analyzed in each group.

SATISFACTION QUESTIONNAIRES

The satisfaction of hospital physicians and community pharmacists who participated in the study group was measured with a written questionnaire.

STATISTICAL ANALYSSES

Using the Student’s t-test or χ² analysis accordingly, comparability of the two groups was assessed for age, gender, length of stay, number of medications on admission, and number of medications at discharge. The χ² test was used to determine differences between the rate of conformity of each group globally and also within hospitals, to compare the conformity for each of the criteria, and to compare the replies in the physician–pharmacist questionnaire. The Wilcoxon test compared the global score of the two groups of respondents. For all tests, the α level used was 0.05. Univariate logistic regressions were conducted to assess the impact of each variable on conformity. Multivariate logistic regression analysis was performed to determine the independent factors that could predict conformity, and odds ratios were calculated with a confidence interval of 95% to evaluate the importance of each factor.

Results

Eighty-nine patients were recruited into the study, including 34 in the DPF group. There were no differences in the initial characteristics of patients admitted into the groups, with an average age of 61 years, 63% women, an average of 5.7 drugs on admission and 6.8 on discharge, and an average length of stay of 14 days. The reasons for exclusion of patients in the UD group were, in order of decreasing frequency: lack of an identifiable community pharmacy, no discharge prescription or no copy of the prescription, transfer to another care unit or to a long-term care facility, inability to reach the pharmacy at discharge, death, and refusal to participate. In the DPF group, nonutilization of the prescription form was the principal reason for exclusion (14 pts.), in addition to the factors enumerated in the UD group.

GLOBAL CONFORMITY RATES

Overall, only 22 of 55 patient profiles (40%) in the control group were judged to be in conformity compared with 28 of 34 patient profiles (82%) in the experimental group (p < 0.001). Table 2 presents the results from each of the three participating hospitals. There was no significant difference in the level of conformity between hospitals in the UD group and the DPF group.

<table>
<thead>
<tr>
<th>Table 1. Individual Criteria for Conformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Criteria</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>1 Prescription of this medication stopped in hospital and is cancelled at the community pharmacy</td>
</tr>
<tr>
<td>2 Prescription of this medication is active and exact at the community pharmacy for the dosage modified in the hospital</td>
</tr>
<tr>
<td>3 Prescription of this medication at the community pharmacy indicates discontinuation of the previous dosage of a medication modified in the hospital</td>
</tr>
<tr>
<td>4 Prescription of this medication is active and exact at the community pharmacy as a new medication started in the hospital</td>
</tr>
<tr>
<td>5 Prescription of this medication is active and exact at the community pharmacy for a medication continued unchanged in the hospital</td>
</tr>
<tr>
<td>6 Prescription profile of the patient at the community pharmacy indicates drug allergies known at discharge</td>
</tr>
</tbody>
</table>

*The unit of analysis is the prescription, not the patient.

Table 2. Rate of Conformity/Nonconformity of the Patient Profiles

<table>
<thead>
<tr>
<th>Hospital</th>
<th>UD Group (n = 55)</th>
<th>DPF Group (n = 34)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conform</td>
<td>Nonconform</td>
<td>Conform</td>
</tr>
<tr>
<td>Hôtel-Dieu (n = 7)*</td>
<td>6 (86%)</td>
<td>1 (14%)</td>
<td></td>
</tr>
<tr>
<td>Notre-Dame (n = 21)</td>
<td>5 (38%)</td>
<td>8 (62%)</td>
<td>6 (75%)</td>
</tr>
<tr>
<td>Saint-Luc (n = 61)</td>
<td>17 (40%)</td>
<td>25 (60%)</td>
<td>16 (84%)</td>
</tr>
<tr>
<td>TOTAL (n = 89)</td>
<td>22 (40%)</td>
<td>33 (60%)</td>
<td>28 (82%)</td>
</tr>
</tbody>
</table>

DPF = drug prescription form; UD = usual discharge.

*Hôtel-Dieu Hospital had no control group; participation of this center was decided once the study started.
CONFORMITY RATES FOR INDIVIDUAL CRITERIA

In a separate analysis, all medications were assessed individually in the UD group (n = 404) and the DPF group (n = 265) (Table 1). Use of the new integrated DPF was associated with a statistically significant reduction in the number of medications that were discontinued during hospitalization, but without notice on discharge (criterion 1), 6.2% versus 1.1% (p < 0.001). Similarly, in the DPF group, there was a decrease of errors in the number of medications started during hospitalization but not prescribed at discharge (criterion 4), 2.3% versus 0% (p = 0.014). Also, we observed a reduction of errors in the number of medications having a dosage change during hospitalization (criterion 2), 2.3% versus 0.4% (p = 0.05). Finally, in the DPF group, there was a decrease in the number of patients with nonconformity in their allergy information (criterion 6), 25.5% versus 8.8% (p = 0.05).

In addition, this pilot project suggests that the reordering of all medications for patients at their discharge may be a determining factor in the conformity of community pharmacy patient profile information (favorable RR 4:1).

PHARMACIST AND PHYSICIAN SATISFACTION

Twenty-three community pharmacists from as many different pharmacies completed the survey, for a response rate of about 50%. This estimate originates from the number of patients in the DPF group (34) plus pharmacies for approximately 10 patients who left with the questionnaire but were excluded from the results. Twelve of the 18 physicians (66%) who participated in the project completed the questionnaire at an Internal Medicine Division meeting at the end of the project. The answers obtained to identical questions are presented in Table 3.

Discussion

In light of the above results, it appears that use of the DPF doubles the conformity rate of patient profile information compared with the usual prescription discharge process (84% vs. 40%, respectively). The study also allowed us to recognize problems related to the discharge prescription and to propose improvements in this situation.

It seems clear that the integrated DPF promotes reordering of medication, since 85% of patients who received it had no medication missed in reordering versus 36% with the ordinary prescription process. One possible explanation is that, in the experimental group, the physician had convenient access to a completed list of medications on admission (recopied by the pharmacist onto the form); in the control group, the physician had to seek out this information in the medical chart, which was not necessarily complete.

The DPF permits the patient profile to be updated with conformity on all criteria. The most important problem of profile information is related to drugs discontinued in the hospital. This form is an important improvement since few physicians communicate the discontinuation of a medication to the community pharmacist; this information is transmitted orally to the patient, if at all. The drugs most frequently implicated were potassium supplements, diuretics, and other cardiovascular agents.

Although both the community pharmacists and the physicians were enthusiastic about the new form, we observed more satisfaction from the pharmacists (Table 3). Based on the written comments that we received, physicians were less satisfied with the design of the form than pharmacists. They found that the space allowed for ordering medication was too small and the renewal box not useful in many cases, especially for narcotics. Pharmacists thought that the gray background present on the original form made some words hard to read.

This study has several limitations. First, both physicians and pharmacists were aware of the study, so they may have modified their behavior during the study period. Second,

<table>
<thead>
<tr>
<th>Question</th>
<th>Pharmacists (n = 23)</th>
<th>Physicians (n = 12)</th>
<th>χ²</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>New discharge prescription form permits better follow-up and comprehension of the changes made to drug therapy during hospitalization</td>
<td>91%</td>
<td>9%</td>
<td>64%</td>
<td>36%</td>
</tr>
<tr>
<td>Pharmacist's notes are or could be useful in providing better follow-up of the patient</td>
<td>70%</td>
<td>30%</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Pharmacist's notes constitute a good means of communication between professionals</td>
<td>87%</td>
<td>13%</td>
<td>27%</td>
<td>73%</td>
</tr>
<tr>
<td>It is pertinent to send a copy of this prescription with the summary from the medical record to the family physician</td>
<td>65%</td>
<td>35%</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>New prescription form could reduce errors and confusion concerning medications after hospital discharge</td>
<td>91%</td>
<td>9%</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>New prescription form could reduce telephone calls to the prescribing physician to clarify the content of a prescription</td>
<td>78%</td>
<td>22%</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>I would like to see this new prescription form used for all hospitalized patients</td>
<td>83%</td>
<td>17%</td>
<td>42%</td>
<td>58%</td>
</tr>
<tr>
<td>Present prescription form is adequate (format, readability)</td>
<td>68%</td>
<td>32%</td>
<td>17%</td>
<td>83%</td>
</tr>
<tr>
<td>GLOBAL SCORE</td>
<td>1.29</td>
<td>1.65</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>

*Scale: 1 = very much in agreement; 2 = somewhat in agreement; 3 = in agreement; 4 = in disagreement; 5 = somewhat in disagreement; 6 = very much in disagreement. (Original scale was in French.)

*Since most of the answers obtained were between 1 and 3, we decided to analyze the results in two groups to determine whether there was a difference in the enthusiasm of the physicians and the pharmacists.
the fact that the two phases of the project were held consecutively may have introduced a bias during the second phase. Third, this short study was not randomized and the number of patients enrolled was relatively small; however, we observed the same results in three different hospitals, which suggests that the results are reproducible. Fourth, this study was conducted when additional resources were available to meet the patients, call the community pharmacist, and write the drug information on the discharge form. Further evaluation is necessary to determine the financial benefits of providing such a service on a permanent basis.

Finally, we recognize that a paper format is not the optimal solution to avoid medical discharge prescription errors and omissions. A study in which hospital and community pharmacies were connected in a network showed that prescriptions entered directly by the physician assisted by a computer program reduced medication errors. Nevertheless, the implementation of an integrated DPF, such as the one used in our study, could be a rapid and effective solution to the present problem while appropriate technologic resources are developed. Future studies should try to measure the impact of those tools on pharmaceutical care, drug-related problems, and outcomes.

Summary

This study suggests that an integrated DPF is well accepted by physicians and pharmacists and promotes significantly increased conformity of patient profile information in community pharmacies. Although not demonstrated, it is probable that such improved conformity between the hospital and community medication profiles will result in a significant reduction in drug-related morbidity in patients.

Nicolas Paquette-Lamontagne BPharm MSc, Pharmacy Department, Centre Hospitalier de l’Université de Montréal, Québec, Canada, Centre for Therapeutic Research, Merck Frosst Canada & Co., Kirkland, Québec, Canada

William M McLean PharmD FASHP FCCP, Head, Pharmaceutical Outcomes Research Unit, Ottawa Hospital–General Campus, Ottawa, Ontario, Canada; Associate Professor, Faculty of Pharmacy, Université de Montréal, Montréal, Québec, Canada

Lysanne Besse BPharm DPH, Assistant Director, Pharmacy Department, Centre Hospitalier de l’Université de Montréal

Jean Cusson MD PhD, Head, Internal Medicine Department, Centre Hospitalier de l’Université de Montréal and Department of Pharmacology, Université de Montréal

Reprints: Nicolas Paquette-Lamontagne BPharm MSc, Centre for Therapeutic Research, Merck Frosst Canada & Co., PO Box 1005, Pointe-Claire/Dorval, Québec H9R 4P8, Canada, FAX 514/428-8502, E-mail nicolas_paquettelamontagne@merck.com

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References


EXTRACTO

OBJETIVO: Determinar si una hoja para escribir recetas para pacientes que son dados de alta de un hospital que integra los medicamentos que estaban tomando al ser admitidos, los cambios realizados durante su hospitalización, y los medicamentos de alta puede mejorar la certeza de la información en los perfiles de medicamentos de estos pacientes en las farmacias de comunidad.

DISEÑO: Estudio multi-centro prospectivo no-aleatorio.

ESCENARIO: Unidades de Medicina Interna de tres hospitales de enseñanza (120 camas) localizados en el Centre hospitalier de l’Université de Montréal.

PARTICIPANTES: Los pacientes admitidos a la unidad de Medicina Interna entre el 4 y el 31 de enero de 1999 en los hospitales St.-Luc y Notre Dame fueron el grupo control y recibieron la hoja usual de alta (UD). Los pacientes admitidos entre el 1 y el 28 de febrero de 1999 constituyeron el grupo experimental y recibieron la nueva hoja (Discharge Prescription Form [DPF]), la cual contiene los medicamentos de admisión y los cambios efectuados durante la estadía del paciente en el hospital.

MEDICIÓN DE RESULTADOS: Los perfiles de medicamentos en las farmacias de comunidad de los pacientes de ambos grupos fueron revisados para determinar el grado de consistencia con los medicamentos de alta. Cada medicamento en el perfil de medicamentos fue evaluado de acuerdo a seis criterios de consistencia. El grado de satisfacción con el DPF de los proveedores de salud se determinó mediante la administración de un cuestionario.

RESULTADOS: Se estudiaron 89 pacientes con un total de 450 medicamentos de alta. El grado de consistencia de los perfiles de medicamentos de los pacientes en las farmacias de comunidad con los medicamentos recetados a estos ser dados de alta del hospital fue mayor para los del grupo donde se usó el DPF que para los del grupo donde se usó la hoja tradicional (82% vs. 40%; p < 0.001). La mejoría de los pacientes se pudo atribuir a tasas de consistencia mayores.
particularmente para dos criterios: medicamentos nuevos ordenados durante la hospitalización y cambios de dosis en el hospital.

CONCLUSIONES: El uso de una hoja que contiene los medicamentos en admisión, cambios durante la hospitalización, y medicamentos de alta aumenta las tasas de conformidad de los perfiles de medicamentos después de la hospitalización. Esta herramienta es bien aceptada tanto por farmacéuticos como por médicos y puede llevar a una reducción en problemas relacionados con medicamentos.

Homero A Monsanto

RÉSUMÉ

OBJECTIF: Le but de cette étude était de déterminer si un formulaire d’ordonnance de départ contenant la liste et les modifications apportées aux médicaments à l’admission des patients augmentait la qualité de la tenue des dossiers-patients des pharmacies d’officine après une hospitalisation, ainsi que de mesurer la satisfaction des pharmaciens et des médecins utilisant cet outil.

MÉTHODOLOGIE: Quatre-vingt-neuf patients provenant de trois unités d’enseignement de médecine interne ont été répartis en deux groupes: l’un recevant une ordonnance de départ usuelle et l’autre recevant le formulaire d’ordonnance de départ. Les dossiers-patients ont été analysés pour calculer un taux de conformité global après l’hospitalisation du patient en évaluant chaque médicament présent à l’admission en fonction de six critères. Un dossier-patient était considéré conforme si tous les médicaments correspondaient aux six critères préétablis. La satisfaction des pharmaciens et médecins impliqués a été mesurée à l’aide d’un questionnaire écrit.

RÉSULTATS: Le taux de conformité global des dossiers-patients d’officine a doublé en passant de 40% (22/55) dans le groupe d’ordonnance usuelle à 82% (28/34) dans le groupe recevant le formulaire d’ordonnance de départ. Les améliorations les plus significatives ont été relevées aux critères ayant trait aux médicaments ayant été cessés à l’hôpital ainsi que pour ceux dont la dose avait été modifiée.

L’utilisation du formulaire a été très bien accueillie par les pharmaciens et les médecins même si les pharmaciens se sont avérés globalement plus enthousiastes que les médecins.

CONCLUSIONS: L’utilisation d’un formulaire d’ordonnance de départ comprenant la liste des médicaments à l’admission double le taux de conformité des dossiers-patients des pharmacies d’officine après une hospitalisation. L’outil est bien accepté par les pharmaciens et médecins et pourrait mener à une réduction significative des problèmes reliés aux médicaments suivant une hospitalisation.

Nicolas Paquette-Lamontagne